

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

MURAKAMI et al. Atty. Ref.: 249-194

Serial No. 09/939,643 Group: 1771

Filed: August 28, 2001 Examiner: Vo

For: SHAPE MEMORY FOAM MATERIAL

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May 13, 2003

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

AMENDMENT AFTER FINAL REJECTION

Responsive to the Official Action dated February 21, 2003, please amend the above-identified application as follows:

IN THE CLAIMS

The following claim set replaces all prior versions, and listings, of claims in the application:

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1. (Amended) A shape memory foam material comprising:

a base foam material having an open-cell structure; and

a thermoplastic substance impregnated and distributed in the cells of said base
foam material and having a melting point lower than that of said base foam material, the
cells of said base foam material at their surface having a hardened layer of the
thermoplastic substance and in contact with the base foam material,

wherein said shape memory foam material is a composite material obtained by
compressing said base foam material and said thermoplastic substance, and

wherein a compressed state of said shape memory foam material is retained in a
room temperature by a said hardened product of said thermoplastic substance existing at
least in the cell surface layer part thereof, and

wherein the compressed state is released by softening said hardened product of
said thermoplastic substance by heating,

said shape memory foam material is prepared by a process of:

(1) impregnating said base foam material with a thermoplastic substance,

(2) heating at a temperature of 80 to 200°C and compressing the impregnated base
foam material at a temperature the same as or higher than a softening temperature of said
thermoplastic substance as well as less than a softening temperature of said base foam
material.

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(3) cooling said impregnated base foam material of step (2) while retaining it in the compressed state, and

(4) releasing the pressure after cooling.

2. (Original) The shape memory foam material according to claim 1, wherein a volume of said base foam material is recovered in 70% or more of an uncompressed state thereof by heating.

3. (Original) The shape memory foam material according to claim 1, wherein a thickness of said base foam material is retained in a half or less of an uncompressed state thereof in a room temperature.

4. (Original) The shape memory foam material according to claim 1, wherein said base foam material is made of one of a thermosetting resin and a cross-linked rubber.

5. (Original) The shape memory foam material according to claim 1, wherein said base foam material is made of urethane.

6. (Original) The shape memory foam material according to claim 1, wherein said base foam material in an uncompressed state has a water absorption coefficient of 0.2 g/cm³ or more, and a bulk density of 100 kg/m³ or less.

7. (Original) The shape memory foam material according to claim 1, wherein said thermoplastic substance is a thermoplastic resin wherein at least one of a glass transition point, a melting point, and a softening temperature is less than 120°C.

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8. (Original) The shape memory foam material according to claim 7, wherein said thermoplastic resin contains at least one selected from the group consisting of an acrylate, a styrene, and a vinyl acetate as a monomer unit.

9. (Original) A method of producing a shape memory foam material, comprising the steps of:

impregnating a base foam material in a thermoplastic substance;

heating and compressing said impregnated base foam material at a temperature the same as or higher than a softening temperature of said thermoplastic substance as well as less than a softening temperature of said base foam material;

cooling down said impregnated base foam material while retaining the compressed state; and

releasing the pressure after cooling.

10. (Amended) A soundproof cover for an automobile engine, comprising a shape memory foam material including:

a base foam material; and

a thermoplastic substance impregnated and distributed in the cells of said base foam material and having a melting point lower than that of said base foam material, the cell of said base foam material at their surface having a hardened layer of said thermoplastic substance and in contact with said base foam material.

wherein said shape memory foam material is a composite material obtained by compressing said base foam material and impregnated with said thermoplastic substance, and

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wherein a compressed state of said shape memory foam material is retained in a room temperature by a said hardened product of said thermoplastic substance existing at least in the cell surface layer part thereof, and

wherein the compressed state is released by softening said hardened product of said thermoplastic substance by heating,

said shape memory foam material is prepared by a process of:

(1) impregnating said base foam material with a thermoplastic substance,

(2) heating at a temperature of 80 to 200°C and compressing the impregnated base
foam material at a temperature the same as or higher than a softening temperature of said
thermoplastic substance as well as less than a softening temperature of said base foam
material.

(3) cooling said impregnated base foam material of step (2) while retaining it in
the compressed state, and

(4) releasing the pressure after cooling.